

AUTOMATED DATA ACQUISITION OF ROADSIDE FEATURES

For:

Northwest Pavement Management Association (NWPMA) and the Federal
Highway Administration (FHWA)

Prepared by:

The Center for Transportation Research and Education
Iowa State University

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Approval for the Center for Transportation
Research and Education (CTRE)

Approval for Iowa State University

Tom Maze, Ph.D.
Director

Richard E. Hasbrook
Contracts and Grants Officer

Introduction

In an era of increased data reporting requirements and limited resources, there has been a growing interest by state, city, and county transportation agencies to provide cost-effective and efficient field information gathering of roadside features. Data collection is a major ongoing local government task which must meet federal, state, and local funding requirements. Understanding the increasing data collection needs, the Northwest Pavement Management Association (NWPMA), whose members consist of city, county, and state transportation agencies in Washington and Oregon, has developed a committee to investigate automated data collection of roadside features.

NWPMA is proposing a video/spatial data acquisition test of roadside features to be funded by the Federal Highway Administration. The test will assess the ability of service providers to demonstrate the feasibility and effectiveness of video technology coupled with global positioning systems (GPS) and/or inertial survey systems (ISS) technologies for the collection and spatial referencing of roadside features while traveling at or near roadway speeds. At this time, no such comprehensive review of data gathering methods have been undertaken on behalf of local governments. Data capture for this project will provide coordination and analysis of such areas as:

- Pavement management
- Sign and pavement marking inventory
- Coordination of signs with pavement markings
- Accident reporting
- Traffic count analysis
- Traffic flow planning
- Sighting assessment
- Bridge and culvert assessments
- Address matching
- Emergency dispatching
- Fire district run-time mapping
- Sheriff and police patrol and crime statistics mapping
- Bus routing (public transit and school district)
- As-built mapping of utilities/facilities (e.g., power, telephone, street lights, guardrail, etc.)

NWPMA has enlisted Iowa State University to (1) assist in the establishment of baseline test procedures, (2) provide vendor test evaluations, and (3) prepare a final written report of the results with recommendations.

Objective

The objective of this project is to show (1) that automated data capture technology has come of age; (2) that commercial vendors can demonstrate the feasibility and effectiveness of video technology coupled with global positioning systems and/or inertial survey systems (ISS) technologies for the collection and spatial referencing of roadside features; and (3) that these technologies can be efficient and cost effective in providing local government officials, managers and staff with the data at the right place, time, and format.

Methodology

The proposal is comprised of three main tasks to be completed by Iowa State University: (1) establish baseline test evaluation procedures, (2) provide vendor test evaluations, and (3) formulate recommendations and disseminate results. These tasks are scheduled to be completed within an 11 month time frame.

Task 1: Establish Baseline Test Evaluation Procedures

During this task, baseline test procedures will be developed. This will involve a review of relevant data requirements for each program of interest and development of criteria evaluation forms for the vendor tests. Additionally, at least one pretest meeting will be conducted to answer vendor questions regarding the tests.

Task 2: Service Provider Tests

Research will be conducted to evaluate the service provider products. The evaluation process will take place during June and July 1997. Due to the participation of local governments in both Washington and Oregon, the test sites will be within a 70 mile radius of the Portland Metropolitan area. At least one or more members of the academic evaluation team will be present during each test. The data capture equipment will be vehicle mounted and traveling at or near roadway speeds. Real time and/or post processed data will be horizontally coordinated in North American Datum of 1983, adjusted in 1991 [NAD83 (1991)] and vertically coordinated to National Geodetic Vertical Datum of 1929 (NGVD 29) based on mean sea level. The data captured shall be

capable of referencing to non-linear measurement systems, e.g., a spatial and linear measurement system such as mile posts.

Task 3: Recommendations and Dissemination of Results

Initial results will be presented orally at the NWPMA annual conference scheduled for October 1997 with a formal written report and recommendations submitted by December 31, 1997.

Benefits

There are several benefits derived from this project: (1) Knowledge will be gained regarding the capabilities of vendors in efficiently capturing roadside features using state-of-the-art technology. This knowledge can assist local governments in selecting vendors who provide data collection services; (2) Service providers will develop a better appreciation of the data collection requirements of local governments. This will help them maintain and develop the most useful products for government officials as they attempt to keep up with federal funding mandates; (3) Specifications will be developed for future procurement of data collection; and (4) Local governments will have a better idea as to the strengths and weaknesses of each type of data collection technology as well as their economic implications and how to integrate the technology into their business plan. This information can be particularly useful in planning and budgeting future data collection efforts.

Budget

The cost for the proposed testing, evaluation, and final report is \$ 99,944 (refer to attachment for a detailed breakdown of the budget). Note that the Center for Transportation Research and Education (CTRE) will support half the salary of one of the research assistants assigned to this project.

Schedule

The overall project is expected to last for 11 months from February 1, 1997 until December 31, 1997. A kick-off meeting is planned with all parties involved. Baseline

test and evaluation procedures will be established initially and will be finalized by May 31, 1997. Service provider test evaluations will take place during June and July. It is anticipated that a draft report will be completed by September 31, 1997 with a formal presentation being made at an annual NWPMA conference in October 1997. Comments from the steering committee will be included in the final report submitted by December 31, 1997 (refer to attached schedule for more detail).

Staffing Plan

Dr. Edward J. Jaselskis, Associate Professor of Civil and Construction Engineering at Iowa State University will be the principal investigator for this project. Dr. Kandiah Jeyapalan, Professor in the Department of Civil and Construction Engineering at Iowa Sate University, will be co-principal investigator. Dr. Jaselskis has been involved with advanced information technologies for the past six years and has received three contracts to develop applications in this area. He has completed a report for the Iowa Department of Transportation, "Advanced Field Data Acquisition Technologies for Iowa Transportation Agencies." [1] Dr. Jeyapalan has unique expertise in the area of GIS, soft photogrammetry, and GPS as it applies to surveying and mapping. Additionally, two consultants will be used on this project. Duane Smith, Associate Director for the Center for Transportation Research and Education (CTRE) at Iowa State University, has had extensive experience in transportation engineering and management having worked for the Iowa Department of Transportation for 18 years. He designed and implemented a sign management system for Commerce City, Colorado while working as a consultant in the Denver metro area. He has served as city traffic engineer for six years in Cedar Rapids, Iowa and Colorado Springs, Colorado in charge of signals, signs, and markings. Dr. Dah-Yinn Lee, Professor in Civil Engineering at Iowa State University, has extensive knowledge in the pavement area and will provide expertise related to evaluating technology capabilities in the pavement management systems area. He has worked at the Long-Term Pavement Performance (LTPP) Division of the FHWA at the Turner Fairbank Highway Research Center on his sabbatical during 1992-94. It is also anticipated that one 1/2 time and one 1/4 time research assistant will be assigned to this project along with involvement of additional hourly support.

Steering Committee

A steering committee will be established to provide guidance to the research evaluation team. This group will be comprised of a select number of NWPMA Automated Data Collection Committee members who will be chosen at a later date.

References

Jaselskis, Edward J. (1994). "Field Data Acquisition Technologies for Iowa Transportation Agencies," Final Report for the Iowa Department of Transportation and the Iowa Highway Research Board, Iowa DOT Project HR-366, ISU-ERI-Ames-94409, August 31, 1994.

Budget

Iowa State University

	FHWA	CTRE
SALARIES AND WAGES		
SENIOR PERSONNEL:		
E. Jaselskis, (~3 months)	\$ 20,250	
K. Jeyapalan, (~1 month)	8,400	
OTHER PERSONNEL:		
2 Research Assistants (11 months)	11,200	\$ 7,250
Undergraduate/graduate hourly support	1,500	
Consultants (D. Smith and D. Y. Lee)	7,000	
Clerical Support	800	
FRINGE BENEFITS		
24.55% of faculty salaries	\$ 7,035	
\$725/yr for research assistant salaries	1,450	
39.45% of clerical salaries	320	
TRAVEL	\$ 17,000	
MISCELLANEOUS MATERIALS AND SUPPLIES	3,000	
(e.g., photocopies, postage, envelopes, and telephone charges)		
REPORT PREPARATION COST	2,000	
TOTAL DIRECT COSTS	\$ 79,955	\$ 7,250
INDIRECT COSTS		
25% of modified total direct costs	\$ 19,989	0
TOTAL DIRECT AND INDIRECT COSTS	\$ 99,944	\$ 7,250

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PROJECT SCHEDULE

